REVISIONARY NOTES ON BRITISH SPECIES OF *PSYCHODA* LATREILLE (DIPTERA, PSYCHODIDAE) INCLUDING NEW SYNONYMS AND A SPECIES NEW TO SCIENCE

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The small pallid mothflies of the genus *Psychoda* are probably among the most neglected members of a family which has otherwise received considerable taxonomic attention. Because of their diminutive size and secretive behaviour, they are largely overlooked by most students of Diptera, but they are in the main both widespread and numerous.

Despite current unpopularity, the study of psychodids has a long history in Great Britain. The Reverend A.E. Eaton studied the family at the turn of the century and was, for his day (and now!) revolutionary in slide mounting many specimens. Additions to the fauna were described by A.L. Tonnoir in 1940, but since that time, no *Psychoda* have been added or critically examined. Satchell (1947*a*) figured and keyed the larvae of *Psychoda* species as he understood them, but he omitted *P. erminea* and treats *parthenogenetica* and *albipennis* as separate species. (These two species are discussed in depth below under *albipennis*). In 1948 he figured and discussed the pupal respiratory horns.

Whilst working on a Handbook to the entire family, hopefully to be published soon by the Royal Entomological Society, it became clear that the genus was overdue for revision, and better figures of critical parts were required. A revised key to the genus will appear in that publication, along with the genitalia and antennal figures so critical in the recognition of the species. The purpose of this paper is to identify certain anomalies in nomenclature, clarify them and describe as new a species which has lain unnoticed in the collections of the British Museum (Natural History).

It is important to define clearly the limits of *Psychoda* treated in this paper, as a number of species have previously been placed in the genus in error. Fortunately, one character allows easy recognition of the genus: the labium of all *Psychoda* species is armed with short, stout teeth, and tends to be quadrate (Fig. 1). Other similar species, such as *lucifugus* (now in *Threticus*), *humeralis* (in *Philosepedon*) and *obscura* (in *Feuerborniella*) have a pad-like labium with setae. The arrangement of the teeth in *Psychoda* may show specific differences, but has not been systematically studied.

Good characters are provided by the apical antennal segments, but these are all too frequently lost, so more reliance is placed on features of the male genitalia, and the form of the female subgenital plate. It is not possible to separate any *Psychoda* with certainty unless the specimen is slide mounted and examined microscopically.

Psychoda alternata Say

Synonyms: *Psychoda tripunctata* Macquart, 1838
Psychoda sexpunctata Phillipi, 1865
Psychoda conspicillata Hutton, 1881
Psychoda schizura Kincaid, 1899
Psychoda floridica Haseman, 1907
Psychoda nocturnala Haseman, 1907
Psychoda bengalensis Brunetti, 1908
Psychoda albimaculata Welch, 1912

Psychoda dakotensis Dyar, 1926
Psychoda alternata var. *marmosa* Abreau, 1930
Psychoda alternata var. *floridica* Johannsen, 1934
Psychoda septempunctata Rapp, 1945

A large and unmistakeable species, wherein the tips of the denuded radial veins are darker than elsewhere. The characteristic V-shaped female subgenital plate is quite unlike any other British psychodid, and the male genital parts are also distinct. In his description of the close relative, *lativentris*, (not recorded from Great Britain), Berdén (1952) states that the type specimen of *alternata* is lost, and this view is endorsed by Quate (1955), who fixes Say's name to the species figured by Tonnoir in 1922 on the basis of the 'first reviser' ruling.

Jezek (1977) resurrected *Tinearia* for *alternata*, *lativentris* and three non-palaearctic species. Whilst recognizing that these species possess some peculiar features, such as the dark wing markings referred to above, reduced antennal ascoids and the absence of a median digit on the female subgenital plate, it is considered premature to remove any species from *Psychoda* sensu stricto in our present state of limited knowledge of the affinities of the species in question.

This species has come to the attention as a pest in trickle-distributor sewage operations, where the larvae can build to enormous numbers, grazing bacteria from the stones and may significantly reduce the efficiency of the water treatment. Satchell (1947*b*) records larvae also from septic tanks, urinals, drains and beds of seaweed. I have seen material bred from a grey squirrel drey, bred it myself from a coot's nest and taken specimens around domestic light.

Psychoda brevicornis Tonnoir

This species is part of the small group of *Psychoda* with basally incomplete wing forks. The male aedeagus has a most distinctive process which basally encircles the main shaft, whilst the female subgenital plate has no appreciable 'shoulder' area.

The larvae of most known *Psychoda* are particularly homogenous in appearance, with a variable number of dorsal sclerotized plates and a respiratory siphon posteriorly which is at least as long as the terminal dorsal segment. The exception to this is the larva of *brevicornis*, which shows adaptations in response to its lifestyle. Unlike other dung-inhabiting species, *brevicornis* lives on the surface of very fresh, semi-liquid dung, and the prominent palmate lateral hairs may assist in buoyancy, whilst the abnormally short siphon reflects the surface dwelling habit.

Psychoda brevicornis appears to be an uncommon species, despite the ready availability of larval habitat. It has been recorded as one of the visitors to spathes of *Arum maculatum*, and I have taken males around domestic lights.

Psychoda cinerea Banks

Synonyms: *Threticus compar* Eaton, 1904
Psychoda compar Tonnoir, 1919
Psychoda prudens Curran, 1924
Psychoda domestica Haseman, 1908

Males of this species belong to a small grouping where the cercopod is short and squat, not resembling the pincers of an earwig, which is the more normal condition. The aedeagus is apically expanded with a sharply pointed asymmetric side-arm. The wide female subgenital plate has a prominently darkened basal line and the median digit has a few fine setae.

P. cinerea is common worldwide, and is an infrequent contaminator of sewage beds. It is much more regularly encountered domestically, as it frequently breeds in

drains and sink overflows. It is thus commonly collected at indoor lights. Somewhat surprisingly, perhaps, it has also been recorded from decaying agarics.

Psychoda crassipenis Tonnoir

Only two *Psychoda* possess symmetrical aedeagi, and are thus readily identifiable, *P. crassipenis*, as the name suggests, has a medially dilated aedeagus, and this serves to distinguish it from males of *P. phalaenoides* (L.). No author other than Quate (1955) appears to record that *phalaenoides* has barbs on the aedeagus, and this also serves to distinguish from *crassipenis* which is unadorned. Females are distinct by virtue of the relative dimensions of the median digit.

In my experience, this species is distinctly rare. I have seen only one male more recent than the type series, and the additional material preserved in spirit mentioned by Tonnoir (1940) cannot now be found. There is also a series of females in the British museum (Natural History) from the Cambridge Botanical Gardens, found in *Arum italicum*.

Psychoda erminea Eaton

Females of this species are unique in possessing two additional lobes on the subgenital plate. Other features of note are the reticulated spermathecae and the prolongation of the median digit into a sharp point. The asymmetric process of the male genitalia is closely applied to, and curves around, the aedeagal shaft.

In his discussion of this species, Jezek (1983) designates a lectotype male from Westrow, Holwell (which he pardonably renders as Westron, Holmall!). The genitalia on this mount have migrated to the extreme edge of a very large coverslip, and cannot now be critically examined. I am at this stage loath to remount, in view of the extreme scarcity of material of this species.

Until recently, nothing was known of the larval habits of this species. It is one of only two species not dealt with by Satchell in his comprehensive monograph of *Psychoda* larvae (1947*a*). I was therefore delighted to be given a male of this species by Mr R.M. Payne which he bred from wild otter spraint.

The limited material in BM(NH) and the few specimens I have collected myself over a 6-year period suggest this is a rare species. This may be an artefact, however, since, with only one exception, all specimens were collected in late autumn or winter, when collecting effort tends to be minimal.

Psychoda grisescens Eaton

Synonyms: *P. horizontala* Haseman
P. pusilla Tonnoir **syn nov.**
P. marylandana del Rosario

P. grisescens is one of the commonest and most widespread of all *Psychoda*. The male has a remarkable squarish subgenital plate with small teeth at the corners, while the female has a curious darkened area basal to the median digit.

I was surprised by my failure to catch *P. pusilla*, as the type series came from the windows of F.W. Edwards' house. The species was distinguished by having three anterior branches to the antennal ascoids, rather than the normal two. Examination of the types in the British Museum (Natural History) revealed that this species is merely *grisescens* with the above antennal aberration. Specimens of *Psychoda* with such odd ascoids are clearly unusual, but at least one other species from North America is recorded with this feature. (Quate, 1955).

P. grisescens has been bred from dung and the fungus *Coprinus atramentarius*.

Psychoda setigera Tonnoir

This species also belongs to the grouping with incomplete wing forks, although it is worth mentioning that I have seen one specimen with only one of the forks thus. Males are quite distinct by virtue of the abruptly tapering dististylus. This organ, as clearly figured by Tonnoir in his 1922 paper, has a dense tuft of hairs basally and two very long flattened spines just basal to the narrowed area. Tonnoir (1940) described what he believed to be the female of the species, and depicted the subgenital plate. Subsequent authors have followed this interpretation, but it is incorrect. I have taken this species *in copula* in a water trap in my garden, and the female so obtained closely resembles *P. surcoufi* Tonnoir. It shares with that species a heart-shaped subgenital plate and a pair of tufted organs basal to this. It differs in having no obvious median keel or apical denticles, and the median digit is very short.

I believe I have now located the female specimen which Tonnoir figured in 1940. It has precisely the data quoted for the allotype of *setigera* (in F.W. Edwards' hand?) and two labels, which must have once corresponded to individual specimens, reading 'type' and 'paratype'. Only the paratype female remains on the slide, which has a partially torn data label stuck over the original determination. Strangely, both determinations are the same! The remaining specimen is labelled '*P. sparsa* n. sp.' in what I believe is Tonnoir's handwriting. This name has never to my knowledge been published, but I hesitate to employ it for Tonnoir's strange female, as the missing type (which could be a male?) may yet be found.

Quate (1955) gives *P. uniformis* del Rosario as a synonym of *P. setigera*, but as the series from which he selected a lectotype comprises females only, and these are quite unlike those described above, this synonymy cannot be valid.

I have taken *setigera* at lights and it has been reared from cow dung, but it is evidently not a common species.

Psychoda surcoufi Tonnoir

Synonyms: *P. subimmaculata* Tonnoir
P. spatulata Satchell
P sigma Kincaid **syn. nov.**

As described above, this species appears to be a close relative of *setigera*, but the male is clearly distinct. *Surcoufi* males have a remarkably short basistylus, almost as wide as long. The dististylus has a truncate end, and at the mid point of the outer face is a long bristle. The female subgenital plate is heart-shaped and has a prominent median keel. As depicted by Duckhouse (1966) in his redescription of the species, there is a pair of short apical denticles. I find that there is also a denticle on either side of the mid area of the keel. The median digit is elongate.

Freeman (1950) indicated that this was a rare species, known only from one Lancashire male. It is now known to be common, and as Le Gros (1966) observes, is quite common in gardens.

Duckhouse (1966) suggested *sigma* Kincaid might be a synonym. However, Satchell informed Quate that he considered the species quite distinct. Reference to the figures of *sigma* in Quate (1955) render this contention untenable as these clearly depict *surcoufi*. *P. sigma* is herewith formally synonymized with *P. surcoufi*. *P. surcoufi* has been recorded as a pest in bulk potato stores (Shaw, 1968) and reared from cow dung. I have examples bred *ex Polyporus squamosus* and *Pluteus cervinus*.

Psychoda phalaenoides L.

Synonyms: *Psychoda pacifica* Kincaid 1897
Psychoda horizontala Haseman 1907

Psychoda tonnoiri Dyar 1926
Psychoda angustafona Rapp 1944
Pericoma pacifica Enderlein 1937

A quite unmistakeable and very common species. As noted above, the aedeagus is bilaterally symmetrical, has tiny barbs at the apex, and is almost as long as the dististylus. Tonnoir (1940) separates females into two subspecies, *P. p. phalaenoides* and *P. p. elongata* on the basis of the relative length of the internal digit, but more work is required to establish the validity of these forms. (I have on one occasion taken both forms in the same locality on a juniper bush.)

The species breeds almost exclusively in cow dung, but there is one record from decaying agarics. Females are also recorded as abundant in spathes of *Arum maculatum*, where they are common pollinating agents. They are not, however, trapped in or by the spathes as generally believed.

Psychoda gemina Eaton

A species with a robust aedeagus with a wide spatula, quite unusual for the genus. I am unable to confirm, with the limited material at my disposal, whether the female subgenital plate has a prominent median rib, as quoted by Tonnoir (1940), but the 'shoulders' of this organ fall away quite markedly, similar to *grisescens*. The species appears to be rare, and I have only seen four specimens in 6 years. It has been reared from leaves and mud in a ditch bottom.

Psychoda minuta Banks

Synonyms: *Psychoda marylandana* del Rosario 1936
Psychoda spreta Tonnoir 1940

The female of this species has a unique crescent-shaped subgenital plate, with a setose median digit. The male is also distinctive because of the two prominent lobes on the subgenital plate and the twisted side-arm of the aedeagus. Quate (1955) examined the syntypes of this species and established the synonymy with *spreta*.

This species is widespread without being common. It has been bred from pigeon guano and captured in a slate mine. Satchell (1947*b*) believed it to breed in rotting vegetation, as it emerged from grass cuttings and scalded *Phormidium* alga. I have bred it from *Polyporous squamosus* and *Grifola frondosa*.

Psychoda lobata Tonnoir

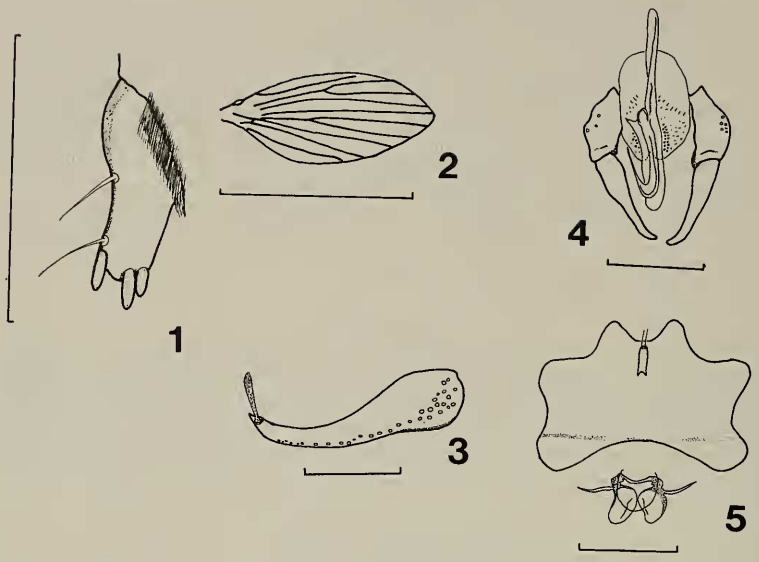
The subgenital plate of this species bears a superficial resemblance to *P. surcoufi*, in that it is heart shaped. However, the keel in that species is missing, as are the basal tufted organs. The base of the plate in *lobata* is deeply cleft, and the whole plate more sparsely haired. The male aedeagus has a darker side-arm at right angles to the shaft.

This species appears to breed exclusively in higher fungi, and I have seen examples from *Coprinus atramentarius*, *Armillaria mellitea*, *Amanita* sp. and *Lyophyllus fumatofoetens*. This has been presumed a unique association and has led to 'overrecording' of this species; many ostensible specimens reared from fungi which I have examined have been other species.

Psychoda buxtoni sp. nov

The presumption that all *Psychoda* breeding in fungi are *lobata* has led to a species having been overlooked. This species is described below.

The seminal papers by Buxton & Barnes (1953) and Buxton (1954, 1960) on Diptera associated with fungi mention no Psychodidae, which Buxton considered remarkable. In fact, Professor Buxton *did* rear several specimens which he submitted



Psychoda buxtoni. 1: labium (scale = 0.1mm), 2: wing of male (scale = 1mm), 3: cercopod of male (scale = 0.1mm), 4: genitalia of male (scale = 0.1mm), 5: subgenital plate of female (scale = 0.1mm).

to the British Museum (Natural History) for identification. These were remounted on slides, but have remained unrecognized in the collections for over 35 years, wrongly identified as *lobata*. It is only fitting that I name this species after Professor Buxton.

Male: head, antennae 16 segmented, terminal 3 segments smaller than preceding, all of similar size. Eye bridge 4 facets wide, interocular space 1–2 facet widths. Labium with three teeth (Fig. 1). Wings; wing forks basally complete, upper clearly nearer wing tip than lower (Fig. 2). Genitalia; Cercopod slightly curved, basally forficulate; retinaculum inserted approximately its own diameter from tip, which is pointed (Fig. 3). Retinaculum approximately one-quarter length of cercopod. Basistylus two-thirds length of dististylus with slight apical curvature. Subgenital plate large, flat, with smoothly curved foremargin. Aedeagal base spatulate, tapering medially and widening to rounded apex. Aedeagal side-arm basally cleft, and strongly recurved for almost half its length (Fig. 4).

Female: differing from male only in genitalic features. Subgenital plate as Fig. 5, median digit elongate with two apical setae. Base of plate darkened.

Holotype: male, Tonbridge, Kent, England, September 1951, bred from *Boletus* sp. Mounted on slide, with genitalia under one coverslip and remainder under another, labelled: *Psychoda lobata* (?). Paratypes: one male, two females with identical data. All specimens in collection British Museum (Natural History).

Psychoda trinodulosa Tonnoir

This species is another of the small group with incomplete basal wing forks. It has male genitalia similar to *brevicornis*, but without the encircling collar of the aedeagal process, and the distylus does not taper abruptly, as in *setigera*. All females of this group are abundantly distinct in the form of the subgenital plate and relative length of the median digit.

P. trinodulosa is believed only to breed in cow dung, and is thus quite widespread. I have taken specimens around domestic light.

Psychoda albipennis Zetterstedt

Synonyms: *Psychoda severini* Tonnoir 1940
Psychoda parthenogenetica Duckhouse 1962
Psychoda satchelli sensu Salamanna (nec Quate 1955) 1975
Psychoda zetterstedti Jezek 1983 **syn. nov.**

This taxon represents the most confused and misinterpreted in the genus. The controversy surrounds essentially three species, *albipennis* Zett., *severini* Tonn. and *parthenogenetica* Duckhouse. Firstly, *parthenogenetica* was raised to full specific rank, from being a subspecies of *severini* Tonnoir, 1940. As the name suggests, it was a taxon known only as females. Duckhouse (1962) also added *severini* to the British list, unfortunately without figuring any critical features.

Jezek (1983) then discussed the status of members of the debatable genus *Logima*, in which he included *albipennis*. He synonymized both *severini* and *parthenogenetica*, since the females appeared identical. However, when seeking a male, he selected a specimen (from over 7000 examined) and, it seems, arbitrarily assigned it to *albipennis*. Having examined the *albipennis* type series he reported that 'the male is unavailable for lectotype designation', and so he designated a female lectotype and paralectotype. The generally common and normally accepted *albipennis* males he *then proceeded to describe* as '*P. zetterstedti*'.

This, however, only added to the confusion. Frequency of association suggests that the common male is the correct male of *albipennis*. Jezek's male assigned to this taxon is not only a unique specimen, but was evidently undescribed. It is therefore in need of a new name, which is given below.

Psychoda jezeki **nom. nov.**

Synonym: *Psychoda albipennis* Jezek, 1983 (pp. 214, 216) partim (male only) nec Zetterstedt, 1850.

P. albipennis males as now defined are very common. The species is a catholic breeder, and has been reared from sewage beds, rotten vegetation and manure of chickens, horse and cow. I have seen material from pigeon guano, horsehoe bat droppings, *Angelica sylvestris* and the fungi *Piptopterus betulinus* and *Polyporus squamosus*. It is a frequent visitor to lights.

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A new RES Handbook for the Tachinidae (Diptera). — Work has just started on a new RES Handbook for the Tachinidae. The BM(NH) collection, upon which the work will primarily be based, has an inadequate series of the following species. Any specimens of these which could be borrowed will be invaluable in constructing a usable key. *Actia exoleta* (Meig.), *Gymnosoma nitens* (Meig.), *Belida angelicae* (Meig.), *Carcelia intermedia* (Herting), *Ceranthia lichtwardtiana* (Villeneuve), *Eurysthaea scutellaris* (R.-D.), *Germaria ruficeps* (Fall.), *Gonia foersteri* (Meig.), *Hemiacquartia paradoxa* Braur & Bergenstamm, *Litophasia hyalipennis* (Fall.), *Phebellia nigripalpis* (R.-D.), *Phebellia stulta* (Zett.), *Siphona mesnili* Andersen.

Any catalogues of tachinid collections held by other individuals or institutions would be useful. These would enable loans, examination and/or exchanges of material to be arranged at a future date.

The assistance of collectors is also requested to help expand the host records of the group. Specimens reared from known hosts would be greatly appreciated. All parts of the puparium and the remains of the host should be included along with the locality, date, host plant/habitat and authority for host identification, if available. The adult fly should ideally be kept alive for a day or two to allow its cuticle to harden. Specimens reared from hosts whose identity is uncertain would also be of value, especially if accompanied by the puparium. Identifications will be provided if requested and the specimens returned by any date required. Any fly which has developed as an internal parasite of another insect, excepting the leaf-hoppers and the aculeate Hymenoptera, will almost certainly be a tachinid.

The RES Handbooks are intended to provide a service for amateur and professional entomologists, and so any comments or suggestions from possible future users of this particular volume are welcomed. — Robert Belshaw, Diptera Section, Department of Entomology British Museum (Natural History), Cromwell Road, London SW7 5BD.